# Unit 6: Probability – Guided Notes

## Lesson 1 – Types of Probability

### Vocabulary

1. **Probability**

   _____
   _____
   _____
   _____

2. **Theoretical Probability**

   _____
   _____
   _____
   _____

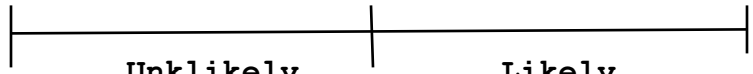
3. **Experimental Probability**

   _____
   _____
   _____
   _____

4. **Event**

   _____
   _____
   _____

**Probability Scale**



Unklikely Likely

0 ½ 1

Impossible As Likely as Not Certain

**Probability is 0 for an impossible event.**
**Probability is 1 for a certain event.**
**Probability is ½ for an even chance.**

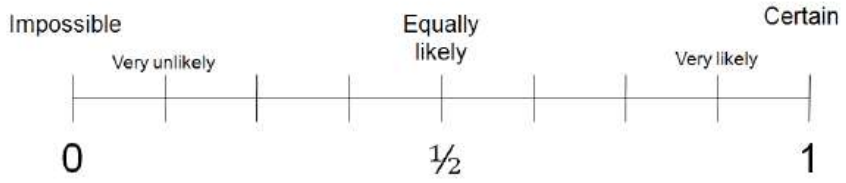
**How likely do you think the following events are to occure?**

1. **Thomas Jefferson, the 3rd President of the US, will visit the College of William and Mary tomorrow? _____**
2. **School will be canceled tomorrow due to bad weather. _____**
3. **If you roll a standard die, it will show a number less than 7. _____**
4. **If you flip a coin, you will get tails. _____**
5. **You roll two number cubes and the sum of the numbers is 10._____**
6. **A bowl contains 14 red marbles and 3 green marbles. You pick a red marble. _____**
7. **A spinner has 10 equal sections marked 1 through 10. You spin and land on a number greater than 0. _____**
8. **A hat contains pieces of paper marked with the numbers 1 through 16. You pick an even number. _____**

**Theoretical vs. Experimental**

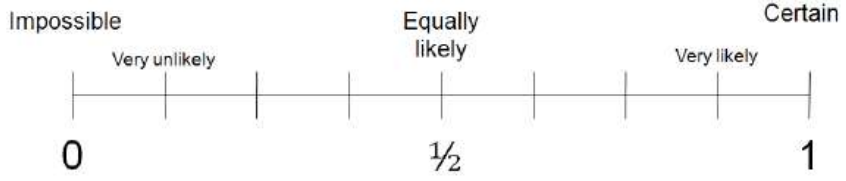
**Theoretical Probability Example 1**

**Find the probability of randomly choosing a blue marble from the marbles shown, then plot the probability on a probability scale.**




**Theoretical Probability Example 2**

**In the change pouch of your wallet you have the following coins: 3 pennies, 2 nickels, 4 dimes and 1 quarter. Without looking you randomly choose a coin, what is the probability you will choose a nickel?**



**Theoretical Probability Example 3**

**In the change pouch of your wallet you have the following coins: 3 pennies, 2 nickels, 4 dimes and 1 quarter. Without looking you randomly choose a coin, what is the probability you will choose a silver coin?**

**Your Turn – Finding Theoretical Probability**

1. **1.Find the probability of randomly choosing a green marble from example 1.**

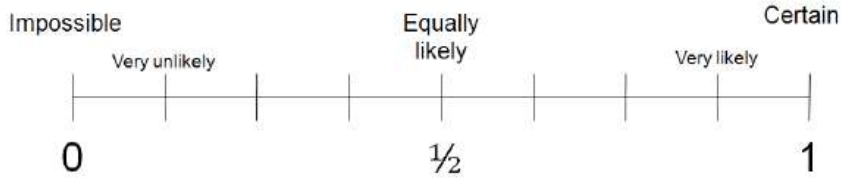
2. **1.Find the probability of getting "tails" when you flip a coin.**

3. **1.Find the probability of rolling a number less than "5" when you roll a number cube.**

**Experimental Probability Example 1**

**A cat that knows the shake commands offers either of its front paws to shake. The table shows the number of times the cat offers each of its paws when asked to shake. What is the likelihood that the cat will offer it right paw when asked to shake?**

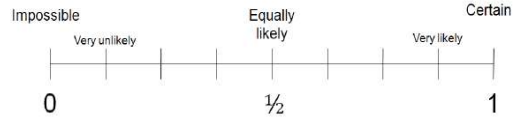
| Paw Offered to Shake | |
|---|---|
| Left paw | 38 |
| Right paw | 12 |




**Experimental probability Example 2**

**A game spinner was spun 500 times. The results of the spins are shown in the table below. What is the probability that the spinner will land on A?**

| | |
|---|---|
| A | 128 |
| B | 267 |
| C | 105 |



**Your Turn…Finding Experimental Probability**

1. **What is the probability that the cat will offer its left paw when asked to shake?**

| Paw Offered to Shake | |
|---|---|
| Left paw | 38 |
| Right paw | 12 |

2. **Of over 20 voters polled after an election for class president, 14 of the voters voted for Sean. What is the probability that a randomly chosen voter voted for Sean?**

# Lesson 2 – SAMPLE SPACES

## Vocabulary

1. **Sample Spaces**

_____

_____

_____

**Sample Spaces Example 1**

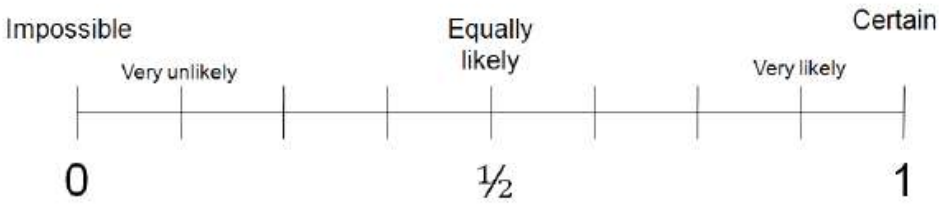
**Determine the SAMPLE SPACE for randomly choosing each color of marble shown. (Remember a sample space is a list of the individual outcomes that are to be considered; their probabilities sum to 1)**

- **Blue**
- **Red**
- **Green**

**Sample Spaces – Example 2**

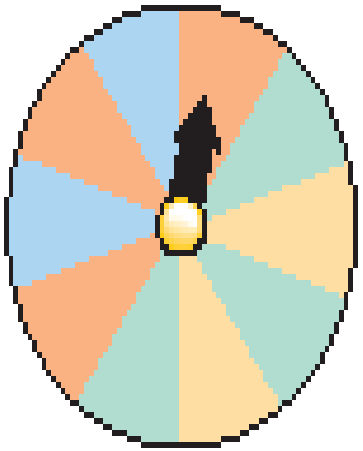
**In the change pouch of your wallet, you have the following coins: 3 pennies, 2 nickels, 4 dimes and 1 quarter. Determine the sample space for randomly choosing each type of coin.**

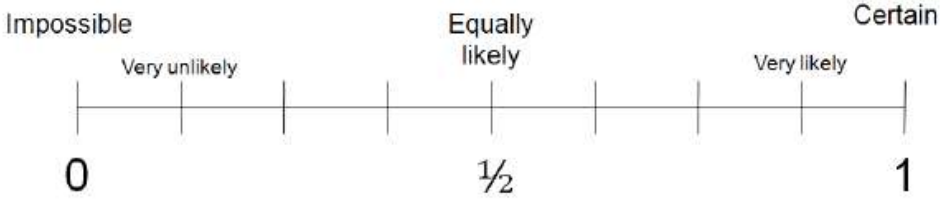
- **Penny**
- **Nickel**
- **Dime**
- **Quarter**




**Your Turn – Sample Spaces**

**Using the spinner shown, determine the sample space for the spinner landing on each color.**



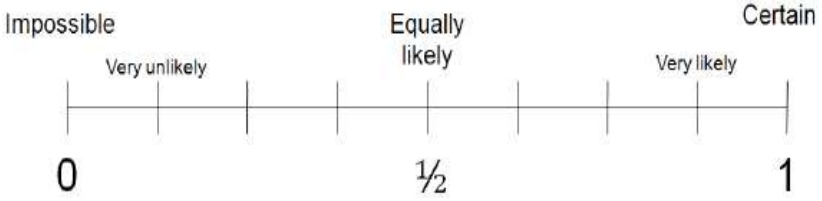


**Your Turn – Sample Spaces and Experimental Probability**

**Consider example 1 –**

**A cat that knows the shake command offers either of its front paws to shake. The table shows the number of times the cat offers each of its paws when asked to shake. Determine the sample space for each of the outcomes.**

| Paw Offered to Shake | |
|---|---|
| Left paw | 38 |
| Right paw | 12 |



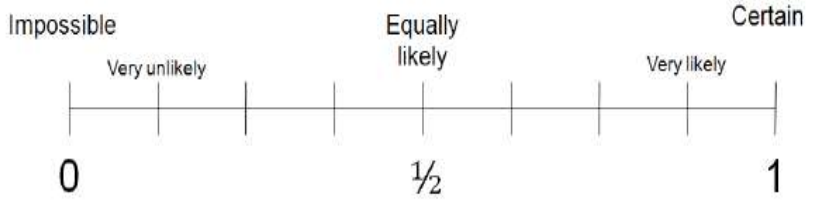

**Your Turn – Sample Spaces and Experimental Probability**

**Consider example 2**

**A game spinner was spun 500 times. The results of the spins are shown in the table below.**

**Determine the sample space for each of the possible outcomes in the table.**

| A | 128 |
|---|---|
| B | 267 |
| C | 105 |



**Lesson 3 – Tree Diagrams, Two-Way Tables & Organized Lists**

**Vocabulary**

**Tree Diagram**

_____

_____

_____

**Compound Events**

_____

_____

_____

**Making a Tree Diagram Example 1**

**You are ordering a fruit smoothie. You have your choice of a small, medium, or large smoothie, and you can include one of the following fruits: strawberries, bananas, or oranges. How many different choices of smoothies do you have?**

**Solution**

**Making a Tree Diagram – Example 2**

**You will be attending two sessions at a science camp. At each session, you will be assigned to one of the following groups: red, green, blue, or yellow. If you will not be assigned to the same group for both sessions, how many group assignments are possible?**

**(Hint: Because you cannot be in the same group for both sessions, do not include the same group in both sessions in the tree diagram.)**

**(Copy the tree diagram here)**

**Answer:**

**Your Turn – Making a Tree Diagram**

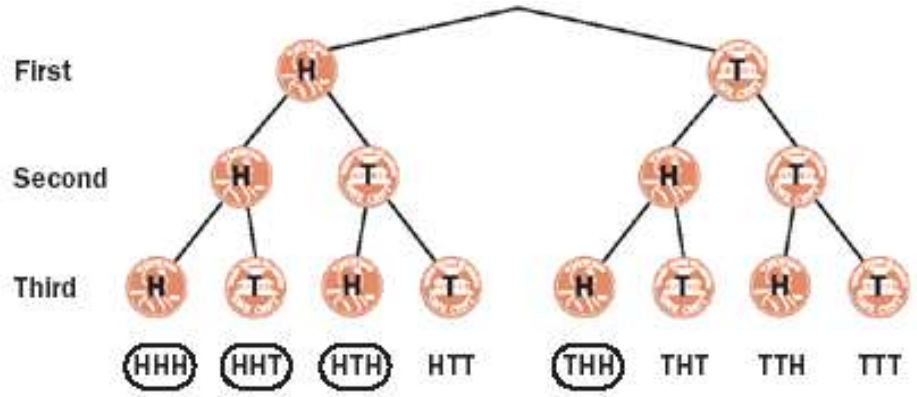
**You decide to get popcorn at a movie theater. The popcorn comes in regular, large, and jumbo sizes, and you have your choice of plain or buttered popcorn. How many choices of popcorn do you have?**

**(Draw your tree diagram here)**

**Solution:**

**Using a Tree Diagram – Example 1**

**To find the probability of getting at least 2 heads when tossing a coin 3 times, make a tree diagram to find the outcomes.**




**Answer:**

**Using a Tree Diagram – Example 2**

**You are choosing an outfit. You can choose a T-shirt (T), a button-down shirt (BD), or a sweater (S) as a top and jeans (J), dress pants (D) or khakis (K) for pants.**

**Make a tree diagram to determine the number of possible outfits you could make.**
**(Make your Tree Diagram here)**

**Let's find the probability that the outfit you choose will have khaki pants in it.**

**Now find the probability that the outfit you choose will be the sweater and jeans.**

**Your Turn – Making and Using a Tree Diagram**

**You are getting ready to make a sandwich for lunch. You can choose a tuna, ham, roast beef or egg salad sandwich and rye, white, wheat or multi-grain bread.**

**First create a tree diagram and them use the outcomes to determine the probability that you will choose your sandwich to be on multi-grain bread.**

**(Create your tree diagram here)**

**Solution:**

**Lesson 4 – The Counting Principle**

**The Counting Principle**

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_____

_____

_____

_____

_____

**Example 1**

**At a track meet there are 6 running events, 3 throwing events, and 2 relay events. If you want to compete in one running event, one throwing event, and one relay event, how many different choices do you have?**

**Solution**

**Example 2**

**The standard New York state license plate has 3 letters followed by 4 digits. How many different license plates are possible if the digits and letters can be repeated?**

**Solution**

**Example 3**

**—In a bag you have two of each letter of the alphabet. You pull out one letter and then without putting it back in the bag you pull a second letter out. What is the probability that you will pull out the same letter?**

**Solution**

**Example 4**

**—In a bag you have two of each letter of the alphabet. You pull out one letter and then without putting it back in the bag you pull a second letter out. What is the probability that both letter you pull out will be vowels?**

**Solution**

**Example 5 - Finding a Probability**

**—You are assigned a computer-generated 4 digit password to access your new voice mail account. If the digits can be repeated, what is the probability that your assigned password is 1234?**

**Solution:**

**Your Turn – The Counting Principle**

**1.You have 35 rock CDs and 12 pop CDs. How many outcomes are possible if you randomly choose 1 rock CD and 1 pop CD?**

**2. You roll a green number cube, a red number cube, and a blue number cube. How many different outcomes are possible?**

**3. In Exercise 2, what is the probability that the green number cube is a 2, the red number cube is a 6, and the blue number cube is a 3?**

**4. In a bag you have two of each letter of the alphabet. You pull out one letter and then without putting it back in the bag you pull a second letter out. What is the probability that the letters you pull out will be an R and an W?**

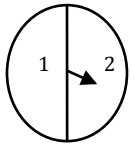
**Lesson 5: Is It Fair?**

**Prediction:**

_____

_____

**Sara and Sheldon are playing a game with the spinner shown. On each turn, a player spins the pointer of the spinner twice. Sara gets a point if the sum of the numbers she spins is even. Is this game fair?**




**Complete the table. For each outcome, tell who would get a point.**

| Outcome | Point Winner |
|---|---|
| 1, then 1 | |
| 1, then 2 | |
| 2, then 1 | |
| 2, then 2 | |

For each turn, the probability that sara will get a point is

For each turn, the probability that Sheldon will get a point is

The game is/is not fair because

_____

**Now Sara and Sheldon are playing a different game. Sara gets a point if the product of the numbers she spins is odd. Sheldon gets a point if the product of the numbers he spins is even. Is the game fair?**